

**SECRET**

21 December 1953

50X1

## MEMORANDUM FOR THE RECORD

SUBJECT: The Ionic Oscillator, Possible Applications

REFERENCE: (a) The Ionic Oscillator by Thomas E. Fairbairn,  
Radio-Electronics, December 1953, p. 76A. Discussion:

1. Subject reference describes the use of certain gas tubes to generate sinusoidal oscillations when they are operated at critical voltage and current values. This work has been done at the U. S. Naval Research Laboratory and the article says that a patent (U. S. Patent No. 2,607,897) was issued on 19 August 1952.

2. A gas triode 884 tube with normal heater current and 17 volts between cathode and plate (no other circuit elements in the plate circuit) oscillated at 500 kc. When a crystal microphone was connected between grid and cathode, the r.f. plate current could be modulated from zero to over 100 percent. The modulated signal was picked up on an ordinary radio receiver 10 feet away from the tube.

3. The information given in the article is rather fragmentary. A number of gas tubes are mentioned and the frequency ranges given, (all the way from 1 cycle to 9 mc. in some special cases.) It is stated that all gas tubes except certain neon tubes oscillate when the applied d.c. voltage is about equal to the ionizing potential. Some tubes, like fluorescent lamps, oscillate over very broad bands but have definite peaks at certain frequencies. Elementary circuit diagrams are given for AM and FM modulation. A circuit is shown for an 884 with microphone input that drives an 807 tube with 40 watts output at 500 kc.

4. It is believed that the Ionic Oscillator may be useful to us in two ways: (1) It might serve as a simple oscillator for a power line carrier system. Conceivably, a gas triode might be built into the stem of a light bulb and, in conjunction with a microphone in the base of the lamp, serve as a surveillance pickup. Getting the d.c. for the

DOCUMENT NO. 2  
NO CHANGE IN CLASS. ☐  
DECLASSIFIED  
CLASS. CHANGED TO: TS S 0200  
NEXT REVIEW DATE: \_\_\_\_\_  
AUTH: HR 70-2  
DATE: 20/11/80 REVIEWER: 037169

gas triode

**SECRET**

**SECRET**

gas triode might be a serious problem. (2) The Ionic Oscillator might also be the solution to the problem of getting a modulated light source that might be viewed by a distant telescopic photocell. If a special fluorescent lamp could be made that would oscillate at a low radio frequency, it might be modulated by a microphone controlling a special grid in the lamp. If d.c. is required for the lamp, the necessary equipment might be hidden in a special starting transformer.

**B. Recommendations:**

1. In view of the possible applications of the Ionic Oscillator, it is recommended that we get in touch with the group at NRL who has done this work. This contact should also be made with a view towards getting NRL to undertake a project of exploring applications to our work.



50X1


TSS/APD



50X1

**Distribution**

APD - Chrono

 - 3

50X1

**SECRET**